Flexion/extension device for MR imaging of the neck
Plus, news from the ASTRO meeting

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Patients often report persistent neck pain following traumatic injury, despite negative findings on magnetic resonance imaging (MRI) studies. In such cases, X-rays taken in flexion/extension may show a disc lesion; but MRI, which is performed with the neck in a neutral position, often does not reveal any abnormality.

Steven L. Rhodes, DCM, a chiropractor from Jacksonville, FL, has worked to prevent this disparity. "This came about after I had a patient with a negative MRI scan, yet I knew something was wrong with her," Rhodes explained. "On a flexion/extension X-ray, I could see malposition of the vertebra. But in that same patient with her head in a neutral position, the vertebra looked OK. I thought that might be what had happened with her MRI scan."

"I asked the staff of an MRI unit to put a patient in flexion/extension so I could duplicate what I was seeing on the X-ray. But, they couldn't do it," he continued. He found that using props or wedges didn't work. "For instance, if you place a round pillow under the patient's neck to put him/her in extension while in the MRI tube laying on the back, biomechanically, that round pillow supports all the vertebrae in the curve and you lose the effect that you get with the patient standing up with their head extended back."

To address this need, Rhodes developed a flexion/extension device for MR imaging, the Rhodes Patented Flexion/Extension Coil, which allows MR studies to be performed with the neck in flexion/extension (Figure 1).

"I had to design it in such a way that the neck coil on the MRI unit could get around the patient and still drop into the recess in the device to allow the same movement of the vertebrae," he explained. "With engineering work, we got it to work on almost all open MRI scanners. We have also custom made one to fit a closed scanner, which requires a different set of mechanics."

"Researchers from a local neuroscience institute saw some of the images and called me to find out how to get them done," Rhodes continued. "After evaluating roughly 100 scans, one of the neurologists conducted an independent study and found that in 40% of patients they found disc lesions when using the device that weren't seen with the patient's head in a neutral position." [Griffiths HJ, Rhodes S, Kidwai A. Radiologic case study. *Orthopedics.* 2003;26:896,989-990.]

"I primarily invented it to help diagnose disc and anterior-posterior longitudinal ligament injury; and it reveals an abundance of injuries that may not be seen with a person lying flat," said Rhodes.

"Some patients had been told that their pain was in their heads since their scans were negative. The nurse on whom I did the first scan was having severe headaches, neck pain, and numbness in her arm; yet she had a negative MRI. She thought she was going crazy."

"As an expert witness in personal injury cases, it's also very important to have a diagnostic study to document and validate where the injury is, otherwise the court will ignore it."

A prospective 1000-case study on the device is planned at the University of Florida in Jacksonville. Each participant will undergo MRI with and without the use of the device.

The device has been FDA registered and is available through a national distributor, Contour Fabricators, Inc. (Fenton, MI). The standard device fits approximately 90% of available open MRI units and custom-designed devices can be created to fit high-field closed MR units.

News from ASTRO

The 45th Annual Meeting of the American Society of Therapeutic Radiology & Oncology (ASTRO) was held October 19 to 23, 2003 in Salt Lake City, UT. Several new technologies for the treatment of cancer were displayed at that conference.

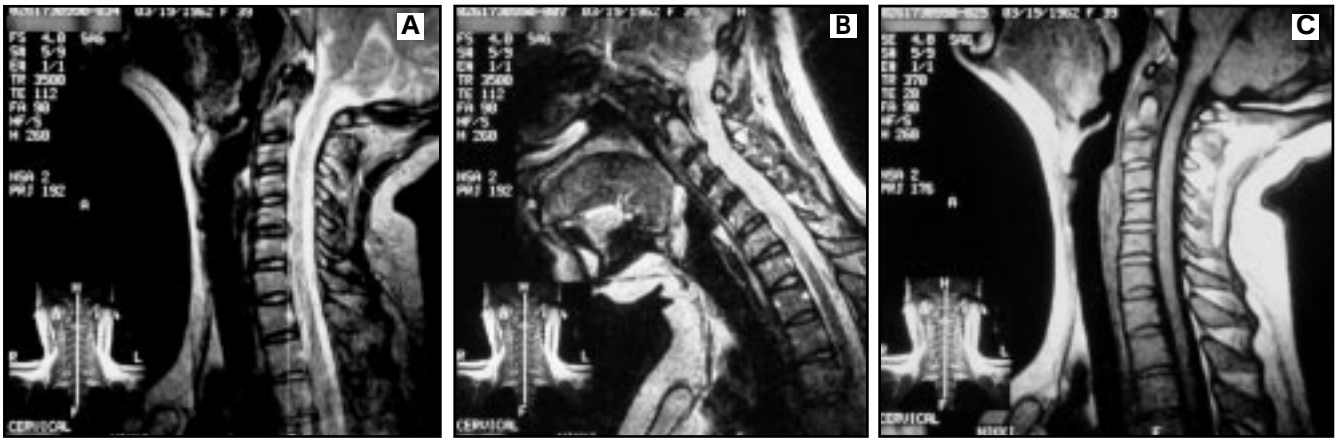

FIGURE 1. *(A and B) MR scans performed using the Rhodes Patented Flexion/Extension Coil with the patient in (A) extension and (B) flexion. (C) MR scan performed, without the device, with the patient's neck in a neutral position.*

New multislice CT for radiation therapy planning

GE Medical Systems (Waukesha, WI), in conjunction with Varian Medical Systems, Inc. (Palo Alto, CA), unveiled a new 4-slice computed tomography (CT) system designed specifically for radiation therapy planning, the GE LightSpeed RT.

"In working closely with clinicians during the development of the LightSpeed RT, we learned that oncologists needed a complete oncology imaging system, not just a wide-bore scanner," said Peter Arduini, General Manager, Global CT at GE. "By combining a multislice, wide-bore, wide field-of-view CT scanner with advanced oncology applications and a powerful productivity workflow engine, we provide the total package."

"On the LightSpeed RT, we have simulated many patients for breast irradiation who were comfortably positioned on the breast angle boards set at 15˚ and 20˚," noted Jay Harris MD, Chair and Professor, Radiation Oncology at the Dana-Farber/Brigham and Women's Cancer Center (Boston, MA). "We are now able to scan patients in a frog-legged position for pelvic sites, as well as accommodate mantle patients in the treatment geometry with greater ease. The large 65-cm display field-of-view offers visualization of peripheral anatomic details that are essential for treatment planning, but would have been lost on conventional 50-cm display views."

The system can be used in conjunction with several advanced applications including GE's Advantage 4D respiratory gating software for tumor and organ motion assessment and margin localization. This application incorporates Varian's RPM Respiratory Gating device.

"Advantage 4D makes it possible to acquire CT scans that capture the motion of tumors and adjacent critical structures," said George T.Y. Chen, PhD, Professor of Radiation Therapy at Massachusetts General Hospital, Boston, MA. "It is a quantum leap for radiation planning in the presence of motion, because it provides a more accurate description of the target and its trajectory. This provides information essential in designing treatment margins and sparing normal tissues."

New image-guided radiation therapy system

Varian Medical Systems also previewed their new image-guided radiation therapy system designed to work with both conventional and stereotactic approaches. The Trilogy system is pending 510(k) clearance from the FDA.

The system can be used to deliver 3D conformal radiotherapy, intensity-modulated radiation therapy (IMRT), stereotactic radiosurgery, fractionated stereotactic radiation therapy, and intensity-modulated radiosurgery for cancer and neurosurgical treatment.

"Trilogy is the first system for delivering all forms of external-beam radiation therapy," said Timothy E. Guertin, President of Varian's Oncology Systems business. "It will enable doctors to choose the most appropriate treatment modality for treating cancer in the body or the head and neck, and to deliver the full spectrum of treatments, all on one machine in a single room."

The new system is based on the company's 23EX Clinac linear accelerator, which has been enhanced for stereotactic applications by increasing its maximum dose delivery rate from 600 to 1000 monitor units per minute and by fine tuning the isocenter to a 1-mm diameter sphere. In addition, the treatment couch can be moved via remote control, thereby speeding treatment and maximizing the number of available beam angles.

With Trilogy, doctors have the option to treat some small lesions using stereotactic radiosurgery, delivered in a single treatment, or stereotactic radiotherapy, delivered over a period of days. It can also be used for conventional and conformal radiation therapy, delivered in daily small doses over a period of weeks.

"In the future, we envision equipping Trilogy with imaging technology that will give doctors radiographic (two-dimensional), fluoroscopic (time-lapse), and cone-beam CT (three-dimensional) images for even more precise patient positioning and tumor localization," concluded Guertin.